1.2 HISTORICAL BACKGROUND

The SFWMM has evolved through the years, driven by the need to evaluate more and more complex water management options. At the time that TP84-3 was published, the model could be run for 14 years of daily hydrologic conditions: from January 1, 1969 to December 1, 1982. By 1985, more data had been gathered and the model could be run for the 1965-1984 period of record. By 1989, the model was successfully used to evaluate the impacts of major projects, such as the west Dade wellfield, Water Management Areas, modified water deliveries to the Everglades National Park General Design Memorandum, to name a few.

In 1990, the model was ported from the Cyber 180/835 mainframe computer to the SunWorkstation™ running under the UNIX™ operating system. Using additional data, the simulation was extended by five years -- making the total simulation from 1965 to 1989 as the period of record. By 1991, several time-invariant data such as topography, land use and aquifer parameters had been updated. A levee seepage component was added to the model as well as a separate module to estimate water supply needs to maintain LEC canals at specified levels. The model was also calibrated for the period 1983-1986 and verified for the period 1987-1989. The model was used to simulate historical water levels at over one hundred monitoring points (observation wells and canal stages) were attempted to be replicated in the model during this process. At this time, the District also had a special interest in simulating the natural system, specifically the remnant Everglades. The man-made infrastructure and man-induced operation policies in the model were removed from the model, resulting in the creation of a separate simulation tool, the Natural System Model (NSM), which was completed in 1991. Since South Florida is considered a rainfall-driven hydrologic system, the NSM has been used to infer how the system might have behaved prior to man's influence on the environment. The NSM and SFWMM are valuable tools that provide technical guidance to the District in its environmental restoration, regulatory and planning functions.

Major algorithmic and functional improvements occurred during the next two years (1992-1993) of model development. District management rules under the Supply-Side Management (SSM) and Water Shortage Plans were included in the model. Newer technology such as the use of Geographical Information System (GIS) enabled the model developers to include additional spatially-oriented features. For example, a procedure to account for moisture levels in the unsaturated zone was added to the portion of the model domain defined by the Lower East Coast developed area. Due to the flexibility and computer power provided by the workstation environment, another calibration effort was completed in 1993. Historical water levels (at canals and monitoring points) and flows (through structures) were matched with simulated values for the 1979-1990 period of record. The recalibration effort was facilitated by the development and implementation of in-house visualization tools. Time series data storage and retrieval for structure discharge were also enhanced by incorporating the Data Storage System (DSS or HECDSS), a database system developed by the Corp's Hydrologic Engineering Center (USACE, 1994).

By 1994, several modifications were initiated in preparation for using the SFWMM to evaluate alternative scenarios that were formulated during the early stages of the Lower East Coast

Regional Water Supply Plan (LECRWSP). In order to track code changes in the SFWMM, the UNIX utility program Source Code Control System (SCCS) was used in 1994. Likewise, to facilitate an efficient review and analysis of the massive model output, several post-processing utilities were developed. In 1995, an improved method for calculating evapotranspiration was included in the model. The LECRWSP has expanded in scope over the years and required more alternatives to be evaluated by the model. As individual options and alternatives were formulated, more management and operational features were incorporated into the model including such items as NSM targets; minimum flow requirements into the Caloosahatchee and St. Lucie estuaries; the East Coast Buffer concept design; detention/reservoirs; Aquifer Storage and Recovery (ASR) facilities; and Best Management Practices (BMPs) in the EAA. The most recent code changes employ several strategies for simulating "minimum flows and levels" in the Everglades (SFWMD, 1995).

As of this writing, the model simulation period is being expanded to include the years 1991 through 1995. Data collection efforts are currently underway to prepare for a new calibration of the model. The need to verify the predictive capability of a simulation model like the SFWMM cannot be overemphasized. By periodically updating the data and algorithms, and eventually recalibrating the model, its predictive capability can be constantly improved. Figure 1.2.1 shows the evolution of the model during the almost three decades of its development, updates and implementations.

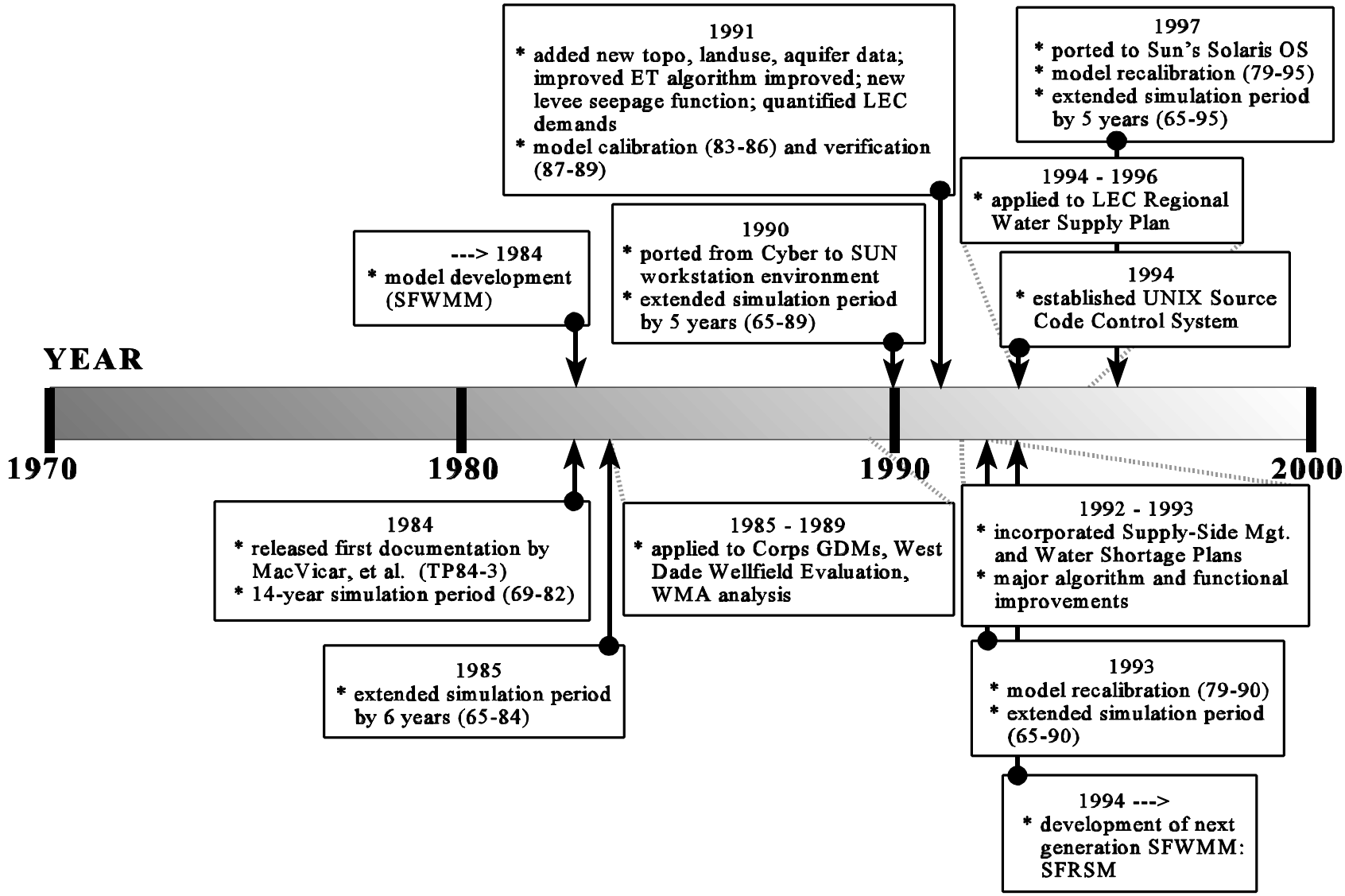

Figure 1.2.1 Evolution of the South Florida Water Management Model